

Copper and Zinc Level in Oral Submucosal Fibrosis (OSMF) Patients

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Abstract

Background :

OSMF is a well recognised potentially malignant condition in oral cavity it may lead to oral cancer, a potentially fatal disease leading to raise in incidence among younger and older people. Trace elements play an important role in growth and maintaining the integrity of cells and tissues. Impaired level of such elements may impair cellular and physiological function. In this study I examined copper and zinc ratio in OSMF patients.

Aim and objective:

To evaluate the level of copper, zinc and copper zinc ratio in serum of patients containing OSMF and to evaluate whether copper and zinc could be used as prognostic indicators in the development of OSMF.

Materials and methods:

60 age and sex matched individuals of OSMF and healthy controls are taken for this study. Under aseptic precautions 5 ml of venous blood was collected and serum copper and zinc level is estimated by spectrophotometric method.

INTRODUCTION

The oral sub mucosal fibrosis is a chronic precancerous condition affecting oral mucosa. In 1966, Pindborg and Sirsat defined OSMF as an insidious chronic disease affecting oral cavity. It is occasionally preceded by vesicles formation, it is always associated with juxta-epithelial inflammatory reaction. It is characterised by inflammation and progressive fibrosis of lamina propria and deeper connective tissue.

The OSMF is mostly found in younger generation, is upsurging and seen in high prevalence in India and South East Asian countries. Etiological factors which trigger the disease process include Areca nut chewing, nutritional deficiencies, immunologic process and genetic predisposition. The disease is world wide like Kenya, UK, China, Saudi Arabia

And other parts of the world. OSMF is considered as an Asian variant of sideropenic dysphasia, where chronic copper and zinc deficiency leads to mucosal susceptibility to irritants such as chilies and Areca nut products.

Trace elements or micro nutrients are chemical elements required in minute amounts. The enzymes of trace elements are an important part of certain biological and chemical reactions. The ratio of copper to zinc is also believed to be a reliable biomarker in the development and progression towards OSMF. Copper is an abundant mineral in the body and is involved in the release process of energy inside the cell formation of red blood cells, collagen production and iron absorption. Zinc is needed for a healthy immune system, cell division, hair, skin and muscle growth.

By taking this in concern a study was made to evaluate the levels of copper and zinc in the blood serum of patients with OSMF and was compared with the normal levels of copper and zinc. This study could help to find the etiological aspect of disease. So that in future, proper preventive measure can be taken to reduce this dangerous disease which is affecting whole population along with young generation.

MATERIALS AND METHODS

Data Source:

Patients were selected from those attending department of oral medicine and radiology Institute of Saveetha Dental College.

Total Sample:

50 individuals

Inclusion Criteria;

1. Patients with age groups 30 – 50 years
2. Patients with OSMF.

Exclusion Criteria:

1. ImmunoCompromised Patients
2. Infectious diseased individuals like Tuberculosis,
3. Endocrine disorders
4. Coronary artery Disease
5. Renal disease
6. Liver disease

Blood Serum Collection:

Informed written consent was obtained from the patients prior the blood sample collection. 5ml of blood sample was aseptically collected in a wide mouthed container. Following the collection, blood was centrifuged at 2500rpm for 15 minutes and then it was analysed by ERBA CHEM 5 semi auto analyser. Serum concentrations of copper were raised in patients with OSMF.

Table 1

Independent 't' test							
	Group	N	Mean	Std. Deviation	Std. Error Mean	't'	Sig
Copper level	Control	22	131.64	17.473	3.725	8.597	0.000
	Cases	22	260.14	67.898	14.476		p<0.01
Zinc level	Control	22	96.95	11.850	2.526	0.752	0.456
	Cases	22	93.95	14.480	3.087		NS

RESULT

In, the study , there were 25 normal individuals who were free from systemic diseases and other habits like tobacco, pan chewing etc. The number of males were more than the females (15/25) .

After the data was collected the mean serum values of both copper and zinc was found. The mean serum zinc level was found to be 96.4 µg/dL and the mean serum copper level was found to be 130.63 µg/dL . The zinc serum was found within the normal range, 60 – 120 µg/dL while copper was found between 100 – 150 µg/dL.

After the data was collected, it was found that the copper levels exceeded the normal while the zinc were found to be low . The serum levels of copper was within the range of 180 – 340 µg/dL and zinc was within the range of 60 -110 µg/dL. The mean values were also calculated. The mean copper value in OSMF patients is 195.89µg/dL and the mean zinc value in OSMF patients is 95.45µg/dL .

Table 1 shows the significant increase in copper level in OSMF patients than controls and at the same time there is a decrease in zinc level in OSMF patients than controls.

DISCUSSION :

Among precancerous conditions, OSMF is of special concern not only due to its crippling condition that it produces in the patients but the total oral mucosa attains malignant condition. The positive association of OSMF risk with increased copper and decreased zinc levels was observed in this study.

Zinc is an important trace element which acts as an antioxidant in food on which the activities of enzymes of the antioxidant system of the body, such as superoxide dismutase depend. In the current study the serum level of zinc was found to be much lower than the control case. The deficiency of zinc can impair the host protective mechanism designed to protect DNA thus increasing the risk of cancer [8] .

Copper is also an another important trace element also showed a significant change in the study . It is useful in producing free oxygen metabolites due to oxidation and regeneration activity [9]. The study showed that the copper level in OSMF patients compared to control cases was increased. Association of elevated copper in OSMF can be correlated with its role in tumour responsible for tumour development and progression [10] .

The serum copper and zinc lever are found to be increased during pregnancy,systemic illness like myocardial infarction, diabetes mellitus, hypertension,liver cirrosis, alcohol consumption. As these factors are excluded in the

study,altered level can be correlated with precancerous States.

The study also showed Cu/Zn ratio elevated inOSMF suggesting the correlation with disease progression. The ratio can serve as a reliable biomarker for the detection of the disease.

CONCLUSION:

From the above study, It is concluded that copper and zinc deficiency develop in OSMF. Copper and zinc level have important causative role in OSMF. Serum copper and zinc level are sensitive, but not specific,whereas serum copper zinc ratio is the most reliable indicator in assessing progression of malignancy. Though the trace elements are required in minimum quantity, their amount is necessary for the functioning of the body. This study indicates that the Copper / zinc ratio can be used as a reliable bio marker for the detection of Oral Cancer

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